

SAFETY PRECAUTIONS

SERVICE WARNING

Only qualified service technicians who are familiar with safety checks and guidelines should perform service work. Before replacing parts, disconnect power source to protect electrostatically sensitive parts. Do not attempt to modify any circuit unless so recommended by the manufacturer. When servicing the receiver, use an isolation transformer between the line cord and power receptacle.

SERVICING THE HIGH VOLTAGE AND CRT

Use EXTREME CAUTION when servicing the high voltage circuits. To discharge static high voltage, connect a 10K ohms resistor in series with a test lead between the receiver and CRT anode lead. DO NOT lift the CRT by the neck. Always wear shatterproof goggles when handling the CRT to protect eyes in case of implosion.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Be aware of the instructions and procedures covering X-ray radiation. In solid-state receivers and monitors, the CRT is the only potential source of X-rays. Keep an accurate high voltage meter available at all times. Check meter calibration periodically. Whenever servicing a receiver, check the high voltage at various brightness levels to be sure it is regulating properly. Keep high voltage at rated value, NO HIGHER. Excessive high voltage may cause X-ray radiation or failure of associated components. DO NOT depend on protection circuits to keep voltage at rated value. When troubleshooting a receiver with excessive high voltage, avoid close contact with the CRT. DO NOT operate the receiver longer than necessary. To locate the cause of excessive high voltage, use a variable AC transformer to regulate voltage. In present receivers, many electrical and mechanical components have safety related characteristics which are not detectable by visual inspection. Such components are identified by a # on both the schematic and the parts list. For SAFETY, use only equivalent replacement parts when replacing these components.

GENERAL GUIDELINES

Perform a final SAFETY CHECK before returning receiver to customer. Check repaired area for poorly soldered connections, and check entire circuit board for solder splashes. Check inner board wiring for pinched wires or wires contacting any high wattage resistors. Check that all control knobs, shields, covers, grounds, and mounting hardware have been replaced. Be sure to replace all insulators and restore proper lead dress.

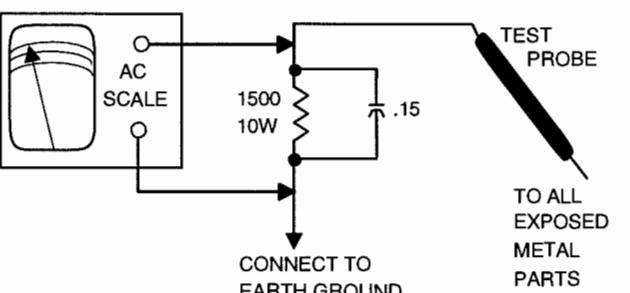
SAFETY CHECKS -- FIRE AND SHOCK HAZARD

Cold Leakage Checks for Receivers with Isolated Ground

Unplug the AC cord, connect a jumper across the plug prongs, and turn the power switch on (if applicable). Use an ohmmeter to measure the resistance between the jumped AC plug and any exposed metal cabinet parts such as antenna screw heads, control shafts, or handle brackets. Exposed metal parts with a return path should measure between 1M ohms and 5.2M ohms. Parts without a return path must measure infinity.

Hot Leakage Current Check

Plug the AC cord directly into an AC outlet. DO NOT use an isolation transformer. Use a 1500 ohms, 10W resistor in parallel with a .15μF capacitor to connect between any exposed metal parts on the receiver and a good earth ground. (See figure below.) Use an AC voltmeter with at least 5000 ohms per volt sensitivity to measure the voltage across the resistor. Check all exposed metal parts and measure voltage at each point. Voltage measurements should not exceed .75VAC, 500μA. Any value exceeding this limit constitutes a potential shock hazard and must be corrected. If the AC plug is not polarized, reverse the AC plug and repeat exposed metal part voltage measurement at each point.



HIGH VOLTAGE SHUTDOWN TEST

Apply 120VAC and turn receiver on. Set all digital customer controls for normal operation. Momentarily short test point X to test point R. Receiver should lose raster and sound. If the receiver does not lose raster and sound, the shutdown circuit should be repaired. To resume normal operation, remove AC power and wait 30 seconds. After restoring AC power, the receiver should power up automatically.

The listing of any available replacement part herein in no case constitutes a recommendation, warranty, or guarantee by Howard W. Sams & Company as to the quality and suitability of such replacement part. The numbers of the listed parts have been compiled from information furnished to Howard W. Sams & Company by the manufacturers of the specific type of replacement part listed.

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SET 4021
TOSHIBA
MODEL CF19G32 (CHASSIS TAC9725)

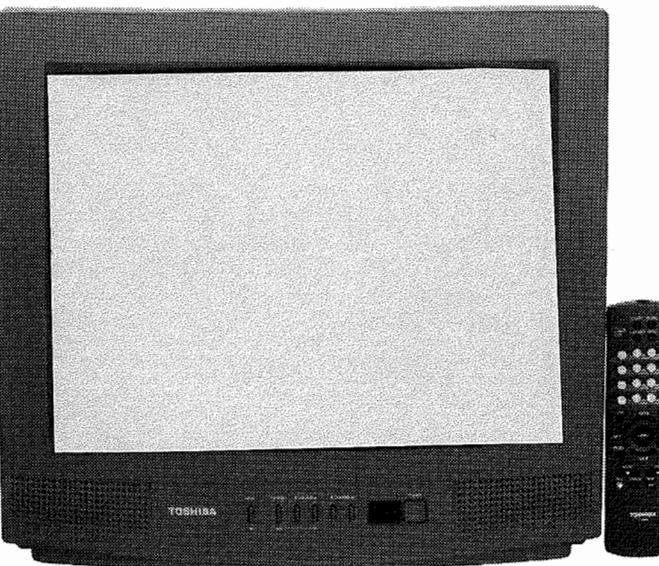
PHOTOFAC[®] Technical Service Data

SET 4021

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TOSHIBA
Model CF19G32 (Chassis TAC9725)



Complete coverage
for servicing a television receiver...

- Schematics
- Parts list
- Component locations
- Troubleshooting guide

Coverage includes these additional models and chassis:

MODELS	CHASSIS
CE19G10	TAC9727
CL20G30	TAC9725



HOWARD W. SAMS & COMPANY

AUGUST 1998 SET 4021

For Supplier Address,
See PHOTOFAC Annual Index

TROUBLESHOOTING

POWER SUPPLY

Check F801, F860, F470, and F889. If F801 is open, check D801 thru D804, D899, C801, C868, C811, C812, C815, G813, G814, G816, and T862. If F860 is open, check Q801. If F470 is open, check Q402, Q404, and T461. If F889 is open, check Q501 and Q610. Apply 120VAC and check for 5.0V at pin 5 of Q840. If 5.0V is missing, check Q840, D840, T840, and C840. If 5.0V is present, press the power button, and check for 163V* at the cathode of D803. If 163V* is missing, check D801 thru D804, SR81, and T801. If 163V* is present, check for 115V at F470. If 115V is missing, check D883, D884, T862, Q801, Q862, and Q883. If 115V is present, refer to the "Horizontal" section of this Troubleshooting guide.

* Taken from common tie point.

HIGH VOLTAGE SHUTDOWN

NOTE: Care should be taken in defeating the high voltage shutdown circuit as this may cause excessive X-ray radiation and damage to the CRT, T461, and associated components. Monitor the high voltage and troubleshoot.

The high voltage from T461 is monitored and rectified by D471. Should the high voltage increase, the rectified voltage at the base of Q471 will also increase and trigger Q471 and Q472 into conduction, shutting down the set. To troubleshoot, attach a jumper from the emitter of Q472 to ground. If the set fails to return to normal operation, check the horizontal and power circuits. If the set returns to normal operation, check for 22.0V at the cathode of D471. If 22.0V is present, check the high voltage shutdown circuit. If 22.0V is missing, check the horizontal and power circuits.

HORIZONTAL

To determine if receiver is in shutdown, refer to "High Voltage Shutdown" section of this Troubleshooting guide. If receiver is not in shutdown, inject a horizontal signal at base of Q404. If horizontal deflection is now present, check Q402, T401, and pins 30 thru 34 of Q501. If there is no horizontal sweep, check Q404, D406, D302, D408, Q421, Q101, and T461. The high voltage rectifier is part of T461 and if defective will affect the performance of horizontal circuits. If the horizontal oscillator is off frequency, check pin 34 of Q501. Horizontal linearity or foldover problems may be caused by C440, C444, C442, and L441 being defective.

TEST EQUIPMENT

Test equipment listed by participating manufacturer illustrates typical or equivalent equipment used by Sams engineers to obtain measurements. This equipment is compatible with most types used by field service technicians.

Equipment	Sencore No.
Oscilloscope	SC3100
Generators	
RGB	CM2125
Multiburst Signal	VG91
Color Bar	VG91
TV Stereo	VG91
Digital VOM	SC3100
Frequency Meter	SC3100
Hi-Voltage Probe	HP200
Accessory Probes	TP212

Equipment	Sencore No.
Isolation Transformer	PR570
Capacitance Analyzer	LC102
CRT Analyzer	CR7000
AC Leakage Tester	PR570
Inductance Analyzer	LC102
Flyback Yoke Tester	TVA92
Field Strength Meter	SL753
Transistor Tester	TF46
Horizontal Analyzer	HA-2500
Video Analyzer	VG91, TVA92

TUNER/IF MODULE INFORMATION

TUNER/IF MODULE VOLTAGE CHART

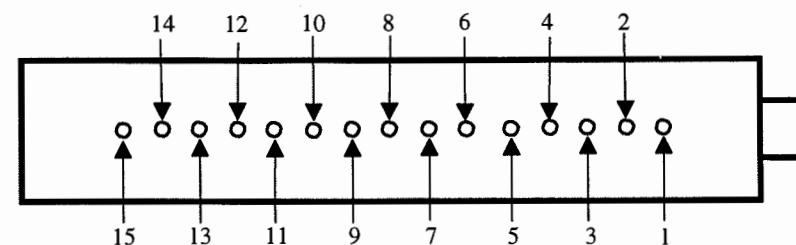
Pin	VHF Low Band	VHF High Band	UHF Band
1 (NC)	0V	0V	0V
2 (+32V)	33.0V	33.0V	33.0V
3 (SCL)	4.7V	4.7V	4.7V
4 (SDA)	4.6V	4.6V	4.6V
5 (NC)	0V	0V	0V
6 (ADS)	4.6V	4.6V	4.6V
7 (+5V)	5.0V	5.0V	5.0V
8 (AGC)	4.3V	4.6V	4.0V
9 (9V)	9.2V	9.2V	9.2V
10 (A OUT)	4.0V	3.5V	3.4V
11 (GND)	0V	0V	0V
12 (AFT)	2.1V	2.1V	2.1V
13 (NC)	0V	0V	0V
14 (GND)	0V	0V	0V
15 (V OUT)	4.6V	4.6V	4.6V

NOTE: VHF Low Band voltages taken on channel 2.

VHF High Band voltages taken on channel 7.

UHF Band voltages taken on channel 14.

TUNER/IF MODULE TERMINAL GUIDE



SCHEMATIC NOTES

For SAFETY use only equivalent replacement part, see parts list.

✗ Circuitry not used in some versions.

--- Circuitry used in some versions.

⏚ Ground

⏚ Chassis ground

▽ Common tie point

△ Taken from common tie point

3 Schematic CIRCUITRACE® Voltage source tie point.

— Cabling: Heavy lines reduce use of multiple lines.

Waveforms and voltages are taken from ground, unless noted otherwise.

Waveforms taken with triggered scope and colorbar signal.

Waveform voltage is peak to peak. Timebase is per division. Waveforms shown at 10 divisions.

Supply voltages maintained as seen at input.

Voltages measured with digital meter and a 1000µV RF signal, with colorbar pattern, applied to antenna terminal.

Controls adjusted for normal operation.

Capacitors are 50 volts or less, 5% or greater unless noted. Electrolytic capacitors are 50 volts or less, 20% or greater unless noted.

Resistors are 1/2W or less, 5% or greater unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

Rated voltage shown on zener diodes.

MISCELLANEOUS ADJUSTMENTS

HIGH VOLTAGE CHECK

Tune in a picture. Set brightness, contrast, and color to minimum. Connect a high voltage probe to the CRT anode. High voltage should read 25kV to 27kV.

PURITY/CONVERGENCE

CRT and yoke are bonded. Adjustment is not recommended.

ENTERING THE SERVICE AND DESIGN MODES

To enter the service mode, press the mute button on the remote. Press the mute button again and keep pressing while simultaneously pressing the menu button on the receiver. The letter S will appear on the screen indicating that the receiver is in the service mode.

To enter the design mode, enter the service mode and press the recall button on the remote and keep pressing while simultaneously pressing the menu button on the receiver. The letter D will appear on the screen indicating that the receiver is in the design mode.

When in the service mode or design mode, press the menu button on the receiver to display the adjustment menu. To select the item to be adjusted, press the channel up or down button. To adjust the reference value, press the volume up or down button. To exit from the service mode or the design mode, press the power button to turn off the receiver.

ITEM BUTTONS

While in service mode some buttons on the remote have a different function. The following is a list of the buttons that will go to an item or perform a different function:

1 RCUT	5 COLC
2 GCUT	6 TNTC
3 BCUT	8 Toggles sound on and off.
4 CNTX	9 Self Diagnostics

TEST PATTERN SELECTION

Enter the service mode. Press the TV/video button on the remote to display the built-in test patterns in the following order:

Normal picture, red raster, green raster, blue raster, black screen, white screen, black screen with white window, black crossbar, white crossbar, black crosshatch, white crosshatch, black crossdot, white crossdot, and back to normal picture.

NOTE: If a video cable is connected to the video input jack, the built-in test patterns will not be displayed on the screen.

SELF DIAGNOSTIC FUNCTION

Enter the service mode. Press the 9 button on the remote to check for proper execution of IC interfacing. The following is an explanation of what is displayed on screen:

Display	Explanation
[SELF CHECK]	Self diagnostic function.
No. 23905569	Part number of QA01
POWER : 000	Operation number of protecting circuit. "000" display is normal
BUS LINE : OK	BUS line check. "OK" is normal. "NG" indicates a short to ground of the SCL or SDA signal or a short between SCL and SDA.
BUS CONT : OK	Bus line acknowledge check. "OK" is normal. A location number is NG.
BLOCK : UV V1	Green display is normal. Cyan display is no check. Red display is NG.

INITIALIZATION OF QA02

NOTE: QA02 must be initialized after replacement.

Enter the service mode. Press the recall button on the remote and keep pressing while simultaneously pressing the channel up button on the receiver. The initialization of QA02 is complete. Perform service mode and design mode adjustments. Program channels into memory.

SUB COLOR (COLC) & SUB TINT (TNTC)

Tune in a color bar pattern. Press the reset button on the remote. Connect an oscilloscope to the red cathode. Enter the service mode. Select item COLC, adjust reference value to obtain 150Vp-p. Tune in an active channel. Select item TNTC, adjust reference value for proper flesh tones.

SUB BRIGHTNESS (BRTC)

Tune in a picture. Set contrast to minimum. Enter the service mode. Select item HIT and reduce the vertical size. Select item BRTC, adjust reference value until vertical retrace line at bottom of screen just disappears. Perform Height (HIT) adjustment. Adjust contrast for normal picture.

WIDTH (WID)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item WID, adjust reference value for slight underscan. Advance the reference value by 7 steps. Check for proper horizontal position of the picture.

E-W PARABOLA (DPC)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item DPC, adjust reference value for straight vertical lines on both sides of the pattern.

HORIZONTAL POSITION (HPOS) & VERTICAL POSITION (VPOS)

Enter the service mode. Press the TV/video button on remote until a crossbar pattern is displayed. Select item HPOS or VPOS, adjust reference value for the horizontal and vertical position alternately until the pattern is centered on the screen. Check the position of the picture with off-air signal.

HEIGHT (HIT)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item HIT, adjust reference value for slight underscan. Advance the data value by 9 steps. Check for proper vertical position of the picture.

WHITE BALANCE (RCUT, GCUT, BCUT, GDRV, BDRV)

Turn receiver on. Allow a 10 to 30 minute warm up time. Adjust contrast to center position, brightness to maximum. Enter the service mode. Press the TV/video button on remote until the white screen pattern is displayed. Select items RCUT, GCUT, and BCUT, set the reference value for each at 40H. Select items GDRV and BDRV, set the reference value for each at 80H. Press the TV/video button on the receiver, to obtain a single horizontal line. Advance the screen control until a faint line of one dominant color appears on the screen. Adjust the other two cutoffs to obtain a dim white line. Press the TV/video button on the receiver, to go to a normal picture. Select items GDRV and BDRV, adjust reference value of each for the best black and white picture on screen.

STEREO ADJUSTMENTS

Attenuator (ATT)

Select pilot, 1kHz audio frequency, and L+R modulating signal. Connect an oscilloscope to pin 40 of QG01. Select item ATT, adjust reference value for 1.55Vp-p.

Stereo VCO (STVC)

Short across resistor RG44, connect a frequency counter to pin 40 of QG01. Select item STVC. Adjust reference value to obtain a reading of 15.73kHz. Remove the short.

SAP VCO (SAVC)

Short across resistor RG44, connect 1M resistor between pin 12 of QG01 and ground. Connect a frequency counter to pin 40 of QG01. Select item SAVC. Adjust reference value to obtain a reading of 78.67kHz. Remove the short and the resistor.

Stereo Filter (STRF)

Remove the solder link at SL02 (located beside RG43). Inject a signal of 15.734kHz, 1Vp-p to the junction of RG43 and RG44. Connect an oscilloscope to pin 40 of QG01. Select item STRF. Adjust reference value to obtain minimum AC noise. Resolder SL02.

Stereo Separation (WBAN) & Spectral (SPEC)

Select stereo mode on receiver. Select pilot, 300Hz audio frequency, and right modulating signal. Connect an oscilloscope to pin 41 of QG01. Select item WBAN, adjust reference value for minimum amplitude of waveform on the scope. Change audio frequency to 8kHz. Select item SPEC, adjust reference value for minimum amplitude of waveform. Repeat until no further adjustment results in an amplitude decrease of waveforms.

Test Audio Signal (1kHz) On And Off

Enter the service mode. Press the 8 button on remote transmitter to toggle the test audio signal (1kHz) on and off.

DESIGN MODE

When QA02 is initialized, design mode items OPT0 and OPT1 are set to preset values. The reference value must be changed to match on set values. See "Design Mode Adjustment Chart".

SERVICE MODE ADJUSTMENT CHART

Item	Adjustment Name	Reference Value	On Set Value
RCUT (1)	Red Cutoff	40H	48H
GCUT (1)	Green Cutoff	40H	63H
BCUT (1)	Blue Cutoff	40H	47H
GDRV (1)	Green Drive	80H	56H
BDRV (1)	Blue Drive	80H	71H
CNTX	Sub Contrast	58H	56H
BRTC (1)	Sub Brightness	40H	39H
COLC (1)	Sub Color	2CH	2AH
TNTC (1)	Sub Tint	42H	3CH
ATT (1)	Attenuator	08H	13H
STVC (1)	Stereo VCO	1CH	14H
STRF (1)	Stereo Filter	16H	1BH
WBAN (1)	Stereo Separation	22H	19H
SPEC (1)	Spectral	30H	15H
SAVC (1)	SAP VCO	88H	17H
AUD	Audio	00H	00H
HPOS (1)	Horizontal Position	16H	1BH
VPOS (1)	Vertical Position	02H	03H
HIT (1)	Height	20H	1EH
LIN	Vertical Linearity	13H	07H
VSC	V-S Correction	00H	0AH
VPS	Vertical Shift	1BH	0DH
VCP	Vertical Compensation	03H	04H
WID (1)	Width	16H	25H
DPC (1)	E-W Parabola	31H	13H
CNR	E-W Corner	00H	06H
TRAP	Trapezium	0FH	10H
HCP	Horizontal Compensation	00H	03H
VFC	V-F Correction	0FH	0FH
PCOL	PIP Color	BFH	20H
PHUE	PIP Tint	06H	40H

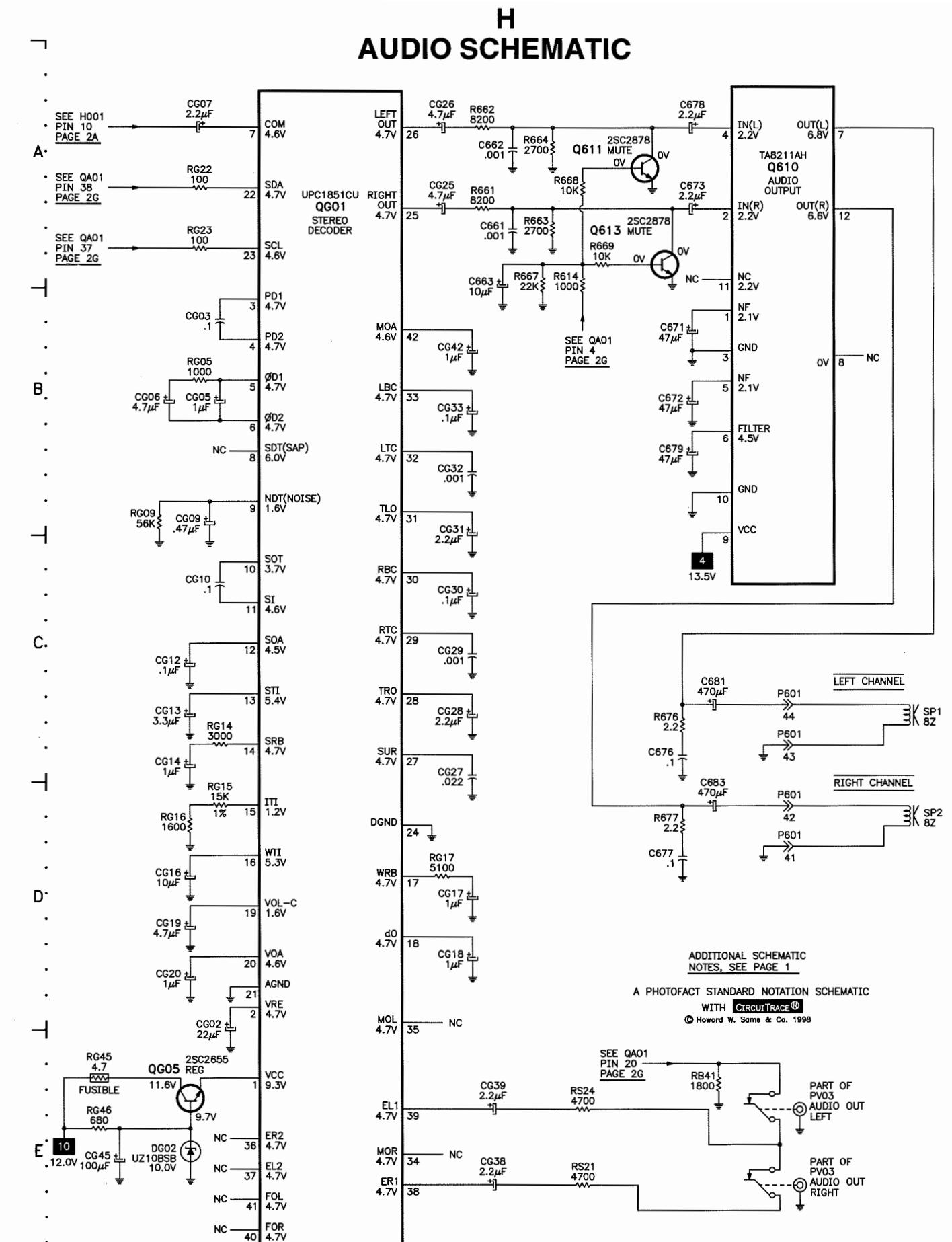
(1) May need adjustment when replacing QA02 or Q501.

MISCELLANEOUS ADJUSTMENTS continued

DESIGN MODE ADJUSTMENT CHART					
Item	Adjustment Name	On Set Value	Item	Adjustment Name	On Set Value
RCUT	Red Cutoff	48H	OFFW	-	56H
GCUT	Green Cutoff	63H	PYD16	PIP Vertical Position 1/16	70H
BCUT	Blue Cutoff	47H	PYD9	PIP Vertical Position 1/9	76H
GDRV	Green Drive	56H	WHP16	PIP Horizontal Centering 1/16 (Fine)	6Ch
BDRV	Blue Drive	71H	WHP9	PIP Horizontal Centering 1/9 (Fine)	53H
CNTX	Contrast Maximum	56H	PNO	-	01H
BRTC	Brightness Center	39H	PRD	-	01H
COLC	Color Center	2AH	PSYNC	PIP Sync	03H
TNTC	Tint Center	3CH	WKY	Set Frame Background Brightness (Usual)	06H
CNTC	Contrast Center	2EH	WKYS	Set Frame Background Brightness (Still)	0CH
CNTN	Contrast Minimum	05H	WKR	PIP Frame Color (Normal)	04H
BRTX	Brightness Maximum	1DH	WKRS	PIP Frame Color (Still)	04H
BRTN	Brightness Minimum	1AH	WKB	PIP Frame Color (Normal)	E4H
COLX	Color Maximum	47H	WKBS	PIP Frame Color (Still)	E4H
COLN	Color Minimum	05H	PBST	Burst Adjust In Displaying Background	20H
TNTX	Tint Maximum	15H	PVU9	PIP Vertical Position 1/9 Top	EAH
TNTN	Tint Minimum	15H	PVD9	PIP Vertical Position 1/9 Bottom	68H
SHPT	Sharpness Center (RF)	2BH	PVU16	PIP Vertical Position 1/16 Top	EAH
SHPV	Sharpness Center (VIDEO)	27H	PVD16	PIP Vertical Position 1/16 Bottom	57H
VM0	Vcd Bit Data	61H	PVW9	PIP Vertical Height 1/9	BDH
ATT	Attenuator	13H	PVW16	PIP Vertical Height 1/16	CEH
STVC	Stereo VCO	14H	PHL9	PIP Horizontal Position 1/9 Left	1CH
STRF	Stereo Filter	1BH	PHR9	PIP Horizontal Position 1/9 Right	83H
WBAN	Wide Band	19H	PHL16	PIP Horizontal Position 1/16 Left	1CH
SPEC	Spectral	15H	PHR16	PIP Horizontal Position 1/16 Right	92H
SAVC	SAP VCO	17H	PHW9	PIP Horizontal Width 1/9	3CH
AUD	Audio	00H	PHW16	PIP Horizontal Width 1/16	2DH
HPOS	Horizontal Position	1BH	RHD	-	01H
VPOS	Vertical Position	03H	WKDP	-	25H
HIT	Height	1EH	PDAT	-	17H
LIN	Vertical Linearity	07H	PVPC	-	AAH
VSC	V-S Correction	0Ah	PHPC	-	50H
VPS	Vertical Shift	0DH	PWR	Detection Number Of Overcurrent and Overvoltage Limiters	00H
VCP	Vertical Compensation	04H	BUS	Check Result Of Bus Line	00H
WID	Width	25H	MEM	Test Pattern Number	00H
DPC	E-W Parabola	13H	OPT0 (1)	Option Setting 0	03H
CNR	E-W Corner	06H	OPT0 (1)(2)	Option Setting 0	67H
TRAP	Trapezium	10H	OPT1 (1)	Option Setting 1	07H
HCP	Horizontal Compensation	03H	BASC	-	20H
VFC	V-F Correction	0FH	TREC	-	20H
PCOL	PIP Color	20H	OSD	OSD Horizontal Position	2AH
PHUE	PIP Tint	40H			

(1) Need adjustment when QA02 is initialized.

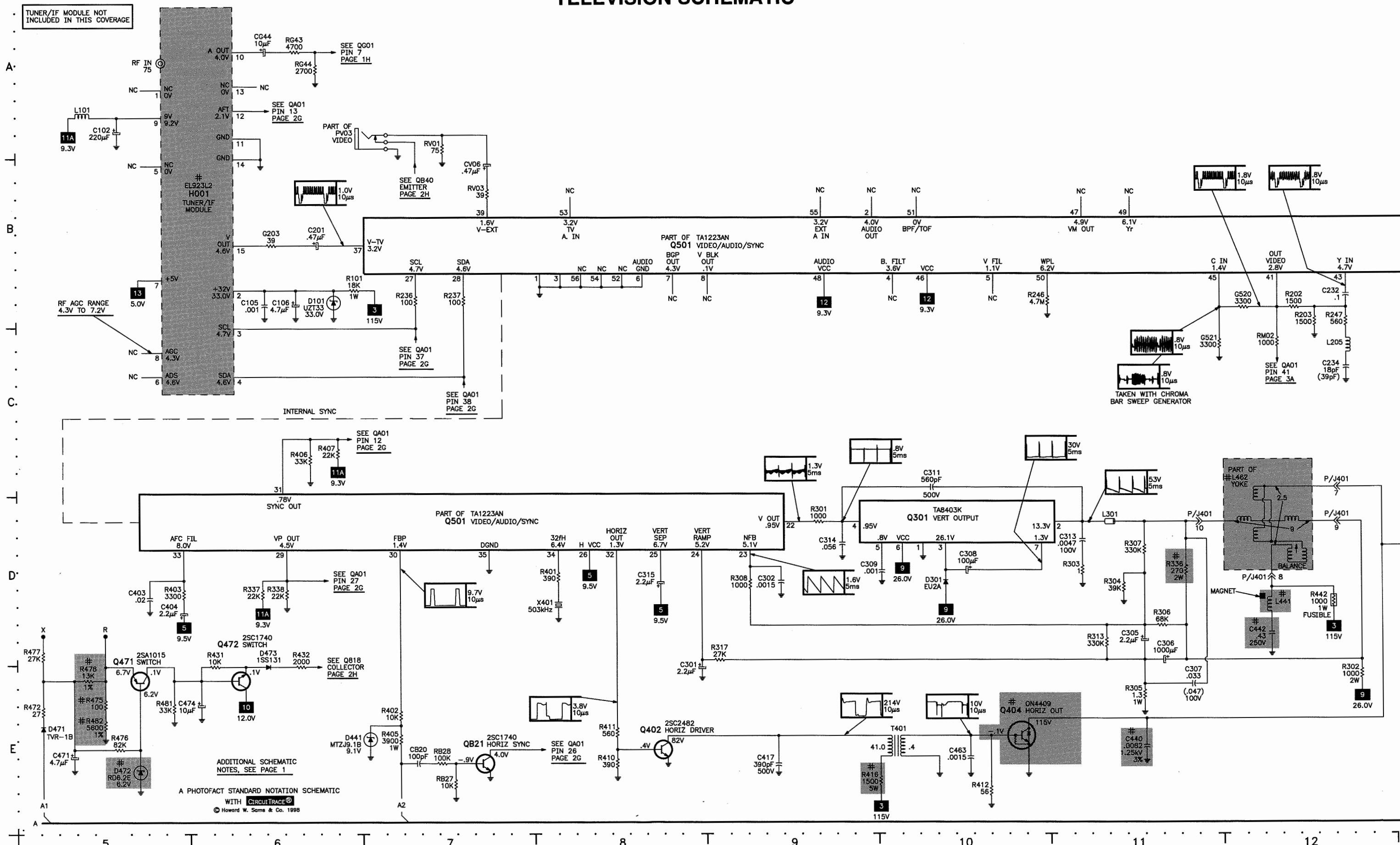
(2) Used with model CE19G10.



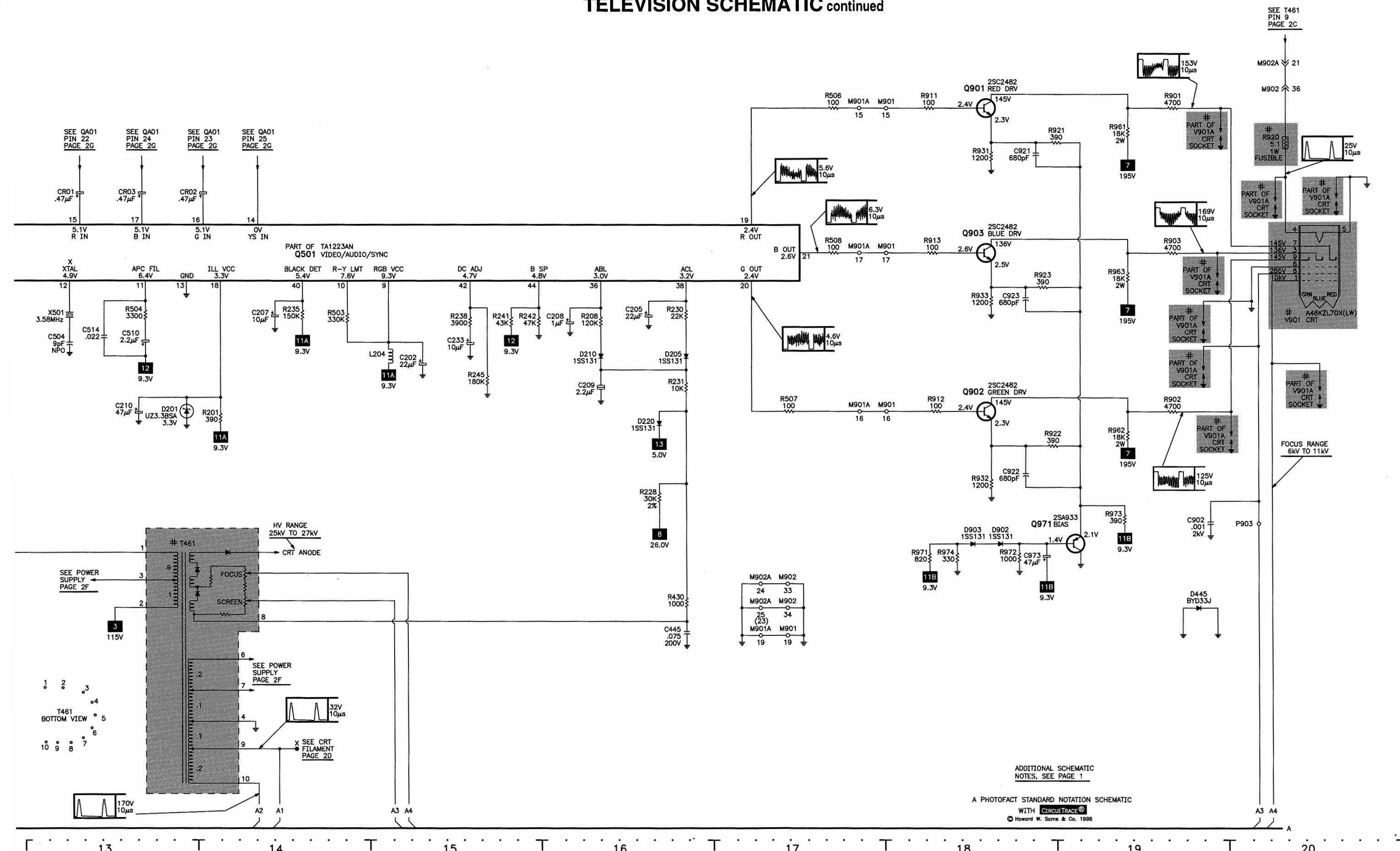
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TELEVISION SCHEMATIC

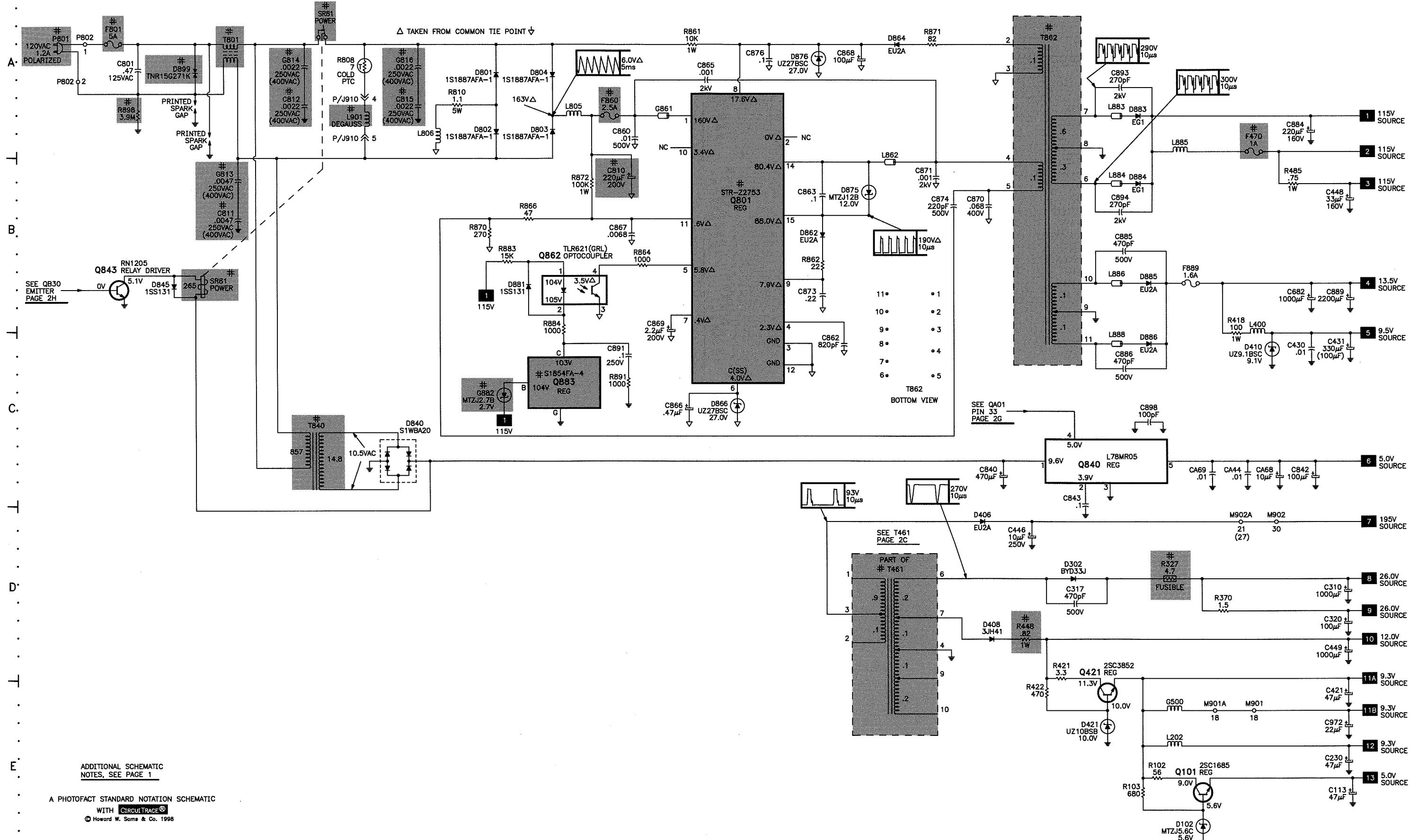
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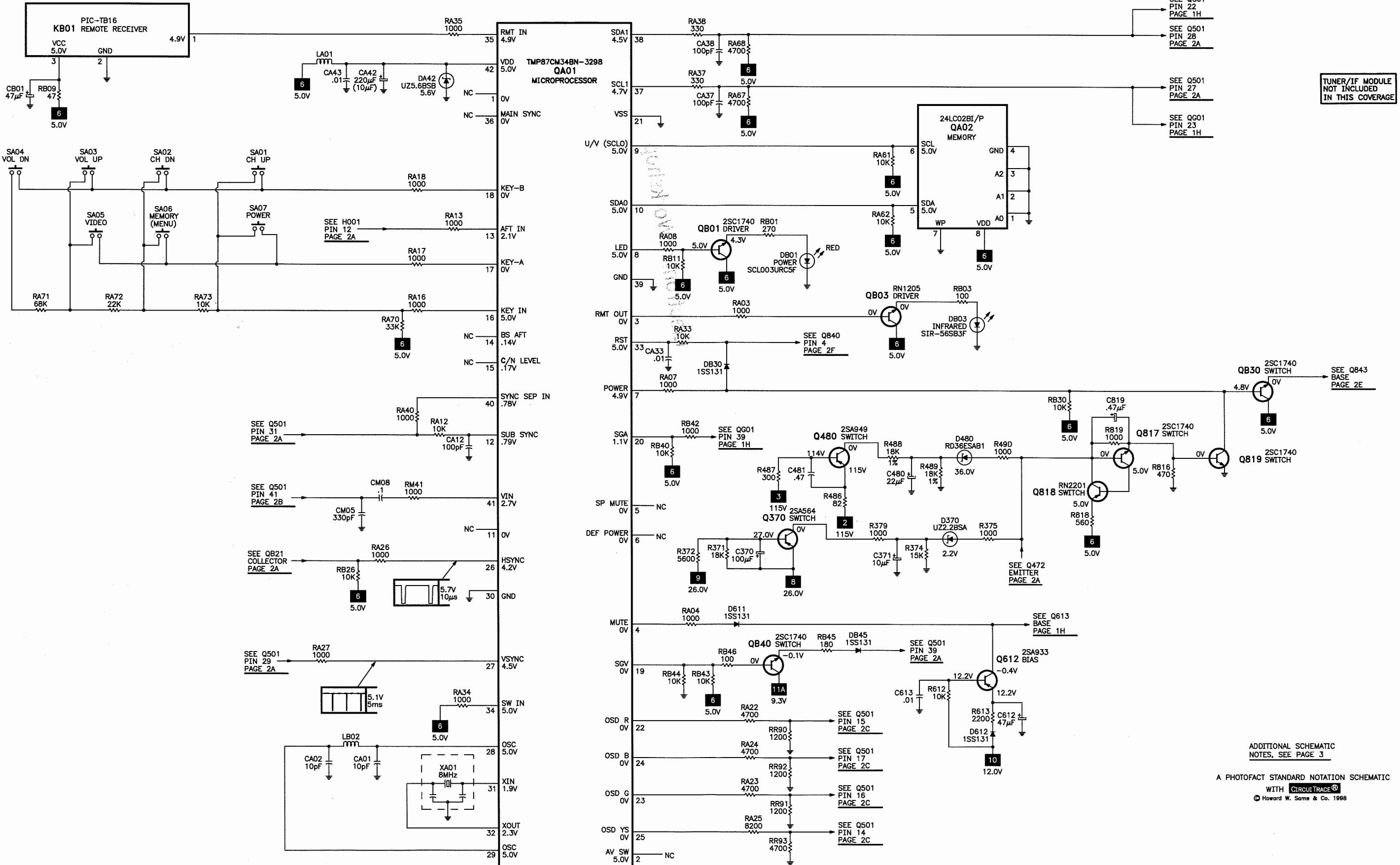
POWER SUPPLY SCHEMATIC



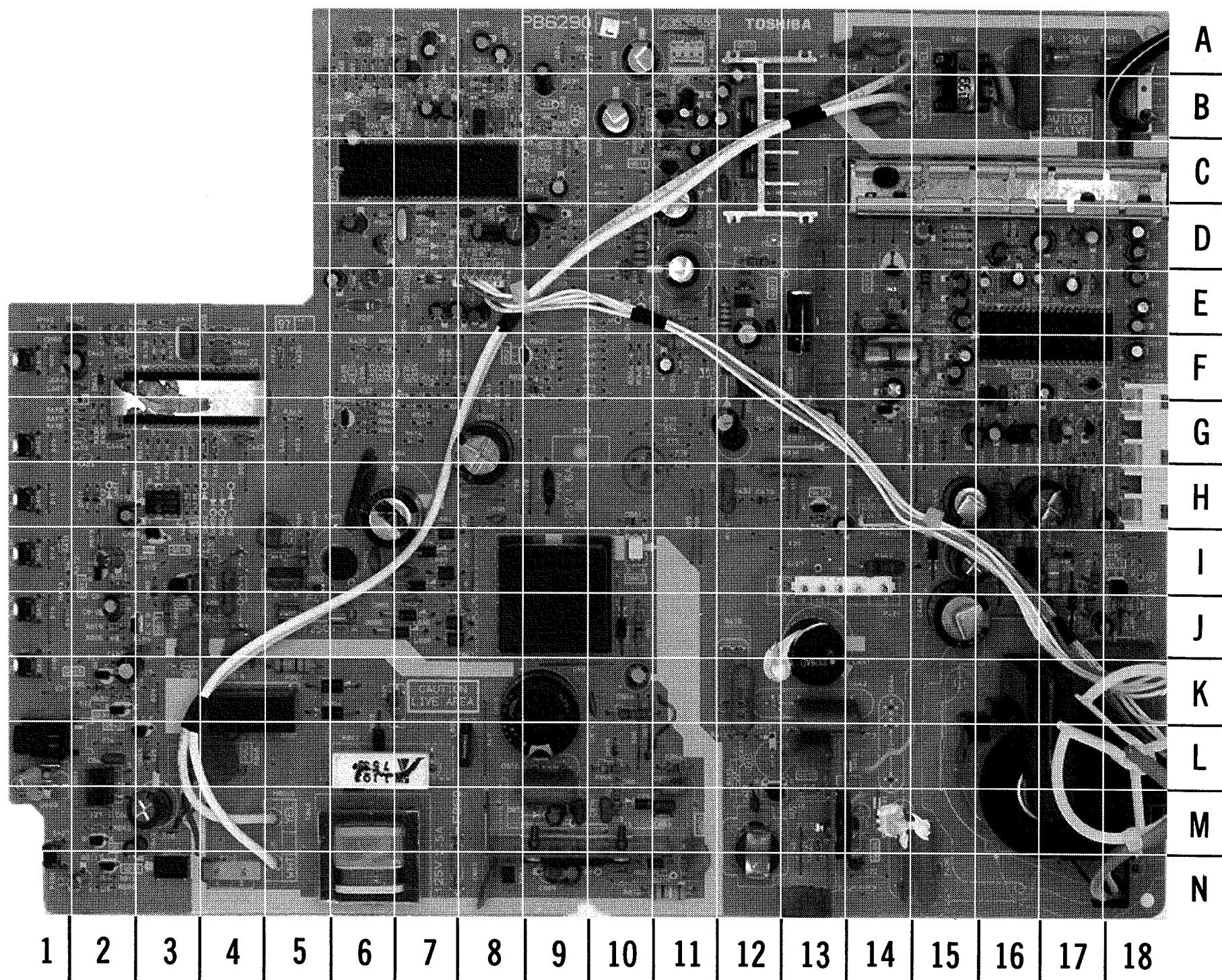
G

SYSTEM CONTROL SCHEMATIC

H



MAIN BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

A
B
C
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J
K
L
M
N

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18

MAIN BOARD, GRIDTRACE LOCATION GUIDE

C102	D-17	C865	N-11	D421	F-15	Q480	I-3	R432	H-12	RB01	N-2
C105	D-18	C866	M-9	D441	I-17	Q501	C-6	R442	I-14	RB03	M-2
C106	D-17	C867	N-10	D471	J-17	Q610	B-12	R448	H-17	RB09	N-2
C113	D-15	C868	K-10	D472	J-18	Q611	C-11	R472	J-17	RB11	N-2
C201	A-8	C869	N-9	D473	H-11	Q612	I-2	R475	I-18	RB26	E-7
C202	D-6	C870	L-9	D480	I-3	Q613	B-11	R476	J-18	RB27	F-9
C205	B-7	C871	L-11	D611	H-2	Q801	N-10	R477	J-18	RB28	F-9
C207	A-8	C873	M-10	D612	H-2	Q817	J-2	R478	I-17	RB30	K-2
C208	B-7	C874	K-10	D801	K-6	Q818	I-3	R481	J-18	RB40	G-6
C209	A-9	C876	M-9	D802	L-6	Q819	K-2	R482	I-18	RB41	I-18
C210	E-6	C884	H-6	D803	L-6	Q840	M-2	R485	I-4	RB42	G-7
C230	B-6	C885	J-7	D804	K-6	Q843	L-3	R486	J-4	RB43	G-6
C232	B-6	C886	J-7	D840	N-3	Q862	I-10	R487	I-4	RB44	G-6
C233	A-7	C889	G-8	D845	L-3	Q883	I-5	R488	J-3	RB45	G-6
C234	A-6	C891	I-5	D862	M-10	QA01	G-2	R489	J-3	RB46	G-6
C301	D-9	C893	I-7	D864	J-10	QA02	H-3	R490	I-4	RG05	F-16
C302	D-8	C894	I-6	D866	M-9	QB01	N-2	R503	D-6	RG09	G-16
C305	F-11	C898	H-8	D875	N-11	QB03	M-2	R504	E-6	RG14	F-17
C306	D-11	CA01	E-4	D876	L-10	QB21	F-9	R506	D-8	RG15	G-17
C307	E-11	CA02	F-4	D881	H-10	QB30	K-2	R507	D-8	RG16	H-18
C308	G-12	CA12	G-4	D883	I-7	QB40	G-6	R508	D-8	RG17	G-17
C309	F-13	CA33	F-4	D884	I-7	QB41	F-16	R612	I-2	RG22	D-17
C310	H-17	CA37	F-2	D885	J-7	QG05	F-18	R613	I-2	RG23	D-16
C311	E-12	CA38	F-2	D886	J-7	R	I-18	R614	G-7	RG43	F-15
C313	E-12	CA42	F-2	D899	B-16	R101	H-12	R661	B-13	RG44	F-15
C314	F-12	CA43	F-2	DA42	F-2	R102	E-15	R662	B-11	RG45	F-15
C315	D-8	CA44	G-2	DB01	L-1	R103	E-15	R663	B-11	RG46	G-15
C317	I-16	CA68	H-2	DB03	L-1	R201	E-6	R664	C-11	RM02	E-1
C320	F-12	CA69	H-2	DB30	K-2	R202	A-6	R667	C-10	RM41	F-2
C370	F-14	CB01	N-2	DB45	F-9	R203	A-6	R668	C-11	RR90	G-7
C371	G-13	CB20	I-17	DG02	G-16	R208	B-8	R669	B-10	RR91	F-8
C403	B-8	CG02	F-15	F470	J-5	R228	I-17	R676	C-11	RR92	F-8
C404	C-9	CG03	F-16	F801	A-17	R230	B-8	R677	C-12	RR93	F-6
C417	M-12	CG05	G-16	F860	N-7	R231	B-9	R808	L-4	RS21	G-17
C421	E-14	CG06	G-16	F889	H-9	R235	A-7	R810	L-6	RS24	G-17
C430	C-9	CG07	F-15	G203	A-9	R236	D-9	R816	J-2	RV01	F-18
C431	D-8	CG09	F-17	G500	E-7	R237	D-9	R818	K-3	RV03	C-5
C440	N-15	CG10	G-17	G520	B-6	R238	B-7	R819	J-2	SA01	K-1
C442	K-13	CG12	G-17	G521	B-6	R241	B-6	R861	K-5	SA02	J-1
C445	J-18	CG13	G-17	G813	B-14	R242	A-6	R862	M-10	SA03	I-1
C446	I-15	CG14	H-18	G814	A-14	R245	A-7	R864	L-11	SA04	H-1
C448	J-15	CG16	F-17	G816	J-4	R246	B-6	R866	L-10	SA05	G-1
C449	H-15	CG17	F-18	G861	N-8	R247	A-6	R870	K-10	SA06	F-1
C463	N-14	CG18	E-18	G882	I-5	R301	F-9	R871	J-10	SA07	N-1
C471	J-18	CG19	E-18	H001	C-16	R302	D-12	R872	N-11	SR81	K-4
C474	H-13	CG20	E-18	KB01	L-1	R303	E-12	R883	I-5	T401	M-12
C480	K-2	CG25	D-18	L101	D-17	R304	F-10	R884	I-5	T461	L-17
C481	I-3	CG26	D-18	L202	B-5	R305	F-11	R891	I-5	T801	B-15
C504	D-6	CG27	D-17	L204	E-6	R306	F-10	R898	C-18	T840	M-6
C510	E-6	CG28	E-17	L205	A-6	R307	E-11	RA03	G-2	T862	J-9
C514	D-6	CG29	E-17	L301	E-12	R308	D-8	RA04	G-3	X	J-18
C612	I-2	CG30	E-16	L400	E-10	R313	F-11	RA07	G-3	X401	B-8
C613	I-2	CG31	E-16	L441	J-13	R317	D-8	RA08	G-3	X501	D-7
C661	B-11	CG32	E-16	L805	K-7	R327	H-16	RA12	G-4	XA01	F-3
C662	B-11	CG33	E-16	L806	L-8	R336	H-13	RA13	G-4		
C663	C-11	CG38	E-15	L862	N-11	R337	B-9	RA16	G-2		
C671	B-12	CG39	E-15	L883	I-7	R338	C-9	RA17	G-2		
C672	B-11	CG42	D-16	L884	I-7	R370	F-14	RA18	G-2		
C673	B-12	CG44	E-15	L885	I-6	R371	F-14	RA22	G-7		
C676	C-12	CG45	G-15	L886	J-7	R372	E-14	RA23	F-7		
C677	C-12	CM05	E-2	L888	J-7	R374	G-13	RA24	F-7		
C678	B-11	CM08	F-2	LA01	F-2	R375	G-12	RA25	F-6		
C679	B-12	CR01	E-7	LB02	F-4	R379	G-14	RA26	F-5		
C681	B-10	CR02	E-7	M901A	E-8	R401	B-8	RA27	F-5		
C682	C-11	CR03	E-8	M902A	I-14	R402	B-9	RA33	F-8		
C683	A-10	CV06	A-7	P401	I-13	R403	C-9	RA34	G-2		
C801	B-16	D101	C-17	P601	A-11	R405	I-17	RA35	G-2		
C810	K-9	D102	E-15	P802	B-18	R406	B-8	RA37	F-3		
C811	B-13	D201	D-7	P910	N-4	R407	B-8	RA38	F-3		
C812	A-14	D205	B-8	PV03	G-18	R410	L-12	RA40	G-5		
C815	J-3	D210	A-9	Q101	E-14	R411	L-12	RA61	H-3		
C819	J-2	D220	G-15	Q301	E-13	R412	M-13	RA62	H-3		
C840	M-3	D301	F-12	Q370	G-14	R416	K-12	RA67	E-3		

IC FUNCTIONS

C102	A-5	C865	A-24	D301	D-10	Q101	E-27	R402	E-7	R963	B-19	SA07	B-30
C105	B-6	C866	C-24	D302	D-26	Q301	D-10	R403	D-5	R971	D-18	SP1	C-4
C106	B-6	C867	B-24	D370	D-34	Q370	D-33	R405	E-7	R972	D-18	SP2	D-4
C113	E-28	C868	A-25	D406	D-26	Q402	E-8	R406	C-6	R973	D-19	SR81	A-22
C201	B-6	C869	C-24	D408	D-26	Q404	E-10	R407	C-6	R974	D-18	SR81	B-21
C202	C-15	C870	B-26	D410	C-27	Q421	E-27	R410	E-8	RA03	B-33	T401	E-9
C205	B-16	C871	B-26	D421	E-27	Q471	E-5	R411	E-8	RA04	D-32	T461	D-14
C207	B-14	C873	B-25	D441	E-7	Q472	E-6	R412	E-10	RA07	C-32	T461	D-25
C208	C-16	C874	B-26	D445	D-19	Q480	C-33	R416	E-9	RA08	B-32	T801	A-22
C209	C-16	C876	A-25	D471	E-5	Q501	B-14	R418	C-27	RA12	C-31	T840	C-22
C210	C-13	C884	A-28	D472	E-5	Q501	B-8	R421	E-26	RA13	B-31	T862	A-26
C230	E-28	C885	B-27	D473	E-6	Q501	D-5	R422	E-26	RA16	B-31	V901	B-20
C232	B-12	C886	C-27	D480	C-34	Q610	A-3	R430	D-16	RA17	B-31	X	D-5
C233	C-15	C889	B-28	D611	D-33	Q611	A-3	R431	E-6	RA18	B-31	X401	D-8
C234	C-12	C891	C-24	D612	E-34	Q612	D-34	R432	E-6	RA22	E-33	X501	B-13
C301	E-8	C893	A-27	D801	A-23	Q613	B-3	R442	D-12	RA23	E-33	XA01	E-31
C302	D-9	C894	B-27	D802	A-23	Q801	B-25	R448	D-26	RA24	E-33		
C305	D-11	C898	C-27	D803	A-23	Q817	C-35	R472	E-5	RA25	E-33		
C306	E-11	C902	D-19	D804	A-23	Q818	C-35	R475	E-5	RA26	D-31		
C307	E-11	C921	B-18	D840	C-23	Q819	C-35	R476	E-5	RA27	D-30		
C308	D-10	C922	C-18	D845	B-21	Q840	C-26	R477	D-5	RA33	C-32		
C309	D-9	C923	B-18	D862	B-25	Q843	B-21	R478	E-5	RA34	E-31		
C310	D-28	C972	E-28	D864	A-25	Q862	B-24	R481	E-5	RA35	A-31		
C311	D-10	C973	D-18	D866	C-25	Q883	C-24	R482	E-5	RA37	A-32		
C313	D-11	CA01	E-31	D875	B-25	Q901	A-18	R485	B-28	RA38	A-32		
C314	D-9	CA02	E-30	D876	A-25	Q902	C-18	R486	C-33	RA40	C-31		
C315	D-8	CA12	C-31	D881	B-23	Q903	B-18	R487	C-33	RA61	B-33		
C317	D-26	CA33	C-32	D883	A-27	Q971	D-19	R488	C-33	RA62	B-33		
C320	D-28	CA37	A-32	D884	B-27	QA01	A-32	R489	C-34	RA67	A-33		
C370	D-33	CA38	A-32	D885	B-27	QA02	B-34	R490	C-34	RA68	A-33		
C371	D-33	CA42	A-31	D886	C-27	Q801	B-32	R503	B-14	RA70	B-31		
C403	D-5	CA43	A-30	D899	A-21	Q803	B-33	R504	B-13	RA71	B-29		
C404	D-5	CA44	C-27	D902	D-18	Q821	E-7	R506	A-17	RA72	B-29		
C417	E-9	CA68	C-28	D903	D-18	Q830	C-35	R507	C-17	RA73	B-30		
C421	E-28	CA69	C-27	DA42	A-31	Q840	D-33	R508	B-17	RB01	B-33		
C430	C-28	CB01	A-29	DB01	B-33	QG01	A-2	R612	D-34	RB03	B-34		
C431	C-28	CB20	E-7	DB30	B-34	QG05	E-1	R613	E-34	RB09	A-29		
C440	E-11	CG02	E-1	DB30	C-33	R614	B-3	RB11	B-32				
C442	D-12	CG03	B-1	DB45	D-33	R661	A-2	RB26	D-31				
C445	D-16	CG05	B-1	DG02	E-1	R662	A-2	RB27	E-7				
C446	D-26	CG06	B-1	F470	B-27	R663	A-2	RB28	E-7				
C448	B-28	CG07	A-1	F801	A-21	R664	A-2	RB30	C-34				
C449	D-28	CG09	C-1	F860	A-24	R667	B-2	RB40	C-32				
C463	E-10	CG10	C-1	F889	B-27	R668	A-3	RB41	E-3				
C471	E-5	CG12	C-1	G203	B-6	R669	B-3	RB42	C-32				
C474	E-6	CG13	C-1	G500	E-27	R676	C-3	RB43	D-32				
C480	C-34	CG14	C-1	G520	C-12	R677	D-3	RB44	D-32				
C481	C-33	CG16	C-11	G521	C-11	R680	A-22	RB45	D-33				
C504	C-13	CG17	D-2	G813	B-22	R685	B-14	RB46	D-32				
C510	C-13	CG18	D-2	G814	A-22	R688	B-7	RB16	C-35	RF IN	A-5		
C514	C-13	CG19	D-1	G816	A-23	R689	B-7	RB18	D-34	RG05	B-1		
C612	E-34	CG20	D-1	G861	A-24	R690	C-15	RG09	C-1				
C613	D-34	CG25	A-2	G882	C-23	R691	A-24	RG14	C-1				
C661	A-2	CG26	A-2	H001	B-6	R692	C-15	RG15	D-1				
C662	A-2	CG27	D-2	KB01	A-29	R694	C-15	RG16	D-1				
C663	B-2	CG28	C-2	L101	A-5	R696	B-10	RG17	D-2				
C671	B-3	CG29	C-2	L202	E-27	R697	C-12	RG22	A-1				
C672	B-3	CG30	C-2	L204	C-15	R698	D-9	RG23	A-1				
C673	A-3	CG31	C-2	L205	C-12	R699	E-12	RG43	A-6				
C676	C-3	CG32	B-2	L301	D-11	R700	D-11	RG44	A-6				
C677	D-3	CG33	B-2	L400	C-27	R701	E-11	RG45	E-1				
C678	A-3	CG38	E-2	L441	D-12	R702	C-24	RG46	E-1				
C679	B-3	CG39	E-2	L462	D-12	R703	D-11	RG47	C-12				
C681	C-3	CG42	B-2	L805	A-24	R704	A-11	RM41	C-31				
C682	B-28	CG44	A-6	L806	A-23	R705	D-9	RR90	E-33				
C683	D-3	CG45	E-1	L862	B-25	R706	D-11	RR91	E-33				
C801	A-21	CM05	C-31	L883	A-27	R707	E-8	R911	A-18	RR92	E-33		
C810	B-24	CM08	C-31	L884	B-27	R708	D-27	R912	C-18	RR93	E-33		
C811	B-22	CR01	B-13	L885	B-27	R709	D-11	R913	B-18	RS21	E-3		
C812	A-22	CR02	B-14	L886	B-27	R710	D-6	R920	A-20	RS24	E-3</td		

PARTS LIST

Important Parts Information

- The parts listed here are those not usually available from a well-stocked supply cabinet or bin.
- Where items may be replaced with equivalent parts, several alternates are shown from participating vendors.
- On the parts lists, safety items are marked with a # to remind you that only exact replacements are recommended for these items.
- When ordering parts, state the model number, part number, and description.

Obtaining Parts

Many of these parts are available from your local Sams authorized distributor or the manufacturer of the equipment. Call Sams for the name of your nearest distributor:

800-428-7267

Or consult the Sams *Annual Index* for the address of the original equipment manufacturer.

Participating Vendors

Information on test equipment and replacement parts is listed in these pages for the following participating vendors. Consult the Sams *Annual Index* for their current address.

- Custom Components Corporation (Chek-A-Color)
- NTE Electronics, Inc. (NTE)
- Philips ECG Company (ECG)
- Sencore, Inc.
- Terrell & Nobis (TNI Electronics)
- Thomson Consumer Electronics, Inc. (SK, TCE)

SEMICONDUCTORS

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D101	UZT33	23316694	-	-	-
D102	MTZJ5.6C	23316673	-	-	-
	RD5.6ESAB3	23118528	-	-	-
	UZ5.6BSC	23316310	-	-	-
D201	UZ3.3BSA	23316292	-	-	-
	MTZJ3.3A	-	-	-	-
	RD3.3ESAB1	-	-	-	-
D205, 10	ISS131	23115537	NTE519	ECG519	SK3100
	ISS120-7	-	-	-	-
D220	ISS131	23115537	NTE519	ECG519	SK3100
D301	EU2A	23118094	NTE552	ECG552	SK9000
	LF-F10	-	-	-	-
	ERB44-06	-	NTE552	ECG552	SK9000
D302	BYD33J	23118479	NTE580	ECG580	SK5036
D370	UZ2.2BSA	23316284	-	-	-
D406	EU2A	23118094	NTE552	ECG552	SK9000
D408	3JH41	A7580658	-	-	-
	RD4Z	-	-	-	-
D410	MTZJ9.1C	-	-	-	-
	UZ9.1BSC	23316325	NTE5018A	ECG5018A	SK9A1
D421	UZ10BSB	23316327	-	-	-
D441	MTZJ9.1B	23316687	-	-	-
	UZ9.1BSB	-	-	-	-
D445	BYD33J	23118479	NTE580	ECG580	SK5036
D471	TVR-1B	A7568460	NTE552	ECG552	SK9000
# D472	RD6.2E	23115774	NTE5013A	ECG5013A	SK6A2
D473	ISS131	23115537	NTE519	ECG519	SK3100
D480	RD36ESAB1	-	-	-	-
	UZ36BSA	23316370	-	-	-
D611, 12	ISS131	23115537	NTE519	ECG519	SK3100
	ISS120-7	-	-	-	-
D801 Thru					
D804	IS1887AFA-1	A7568754	NTE116	ECG116	SK3312
D840	SIWBA20	23316962	-	-	-
	SIWBA60	-	NTE5332	ECG5332	SK9232
D845	ISS131	23115537	NTE519	ECG519	SK3100
	ISS120-7	-	-	-	-
D862, 64	EU2A	23118094	NTE552	ECG552	SK9000
D866	UZ27BSB	23316360	-	-	-
	RD27ESAB3	-	-	-	-
	MTZJ27C	-	-	-	-
D875	MTZJ12B	-	-	-	-
	UZ12BSB	23316333	-	-	-
	RD12ESAB2	-	-	-	-
D876	UZ27BSB	23316360	-	-	-
	RD27ESAB3	-	-	-	-
	MTZJ27C	-	-	-	-
D881	ISS131	23115537	NTE519	ECG519	SK3100
	ISS120-7	-	-	-	-
D883, 84	EG1	23316813	NTE116	ECG116	SK3312
D885, 86	EU2A	23118094	NTE552	ECG552	SK9000
# D899	TNR15G271K	-	-	-	-
	ENC271D-14A	24000268	-	-	-
D902, 03	ISS131	23115537	NTE519	ECG519	SK3100
DA42	UZ5.6BSB	23316309	NTE5011A	ECG5011A	SK5A6
	RD5.6ESAB2	-	NTE5011A	ECG5011A	SK5A6
DB01	SCL003URC5F	23358501	-	-	-
DB03	SIR-56SB3F	23358522	-	-	-
DB30, 45	ISS131	23115537	NTE519	ECG519	SK3100
	ISS120-7	-	-	-	-

For SAFETY use only equivalent replacement part.

SEMICONDUCTORS continued

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
DG02	UZ10BSB	23316327	-	-	-
	RD10ESAB2	-	-	-	-
# G882	MTZJ2.7B	23316653	-	-	-
Q101	2SC1685-Q, TH	23114552	-	-	-
	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1815Y	-	NTE85	ECG85	SK3124A
Q301	TA8403K	B0377890	-	-	-
Q370	2SA564AQTH	-	NTE290A	ECG290A	SK9132
	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
# Q404	2SC2482FA-1	A6330069	NTE399	ECG399	SK9352
Q421	ON4409	23314375	-	-	-
	2SC3852	23314141	NTE56	ECG56	SK9364
	2SD1405BL	23314565	-	-	-
	2SD1944H	23314707	-	-	-
Q471	2SA1015-0	A6534036	NTE290A	ECG290A	SK9132
Q472	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
Q480	2SA949-Y(C)	A6532853	NTE383	ECG383	SK9138
Q501	TA1223AN	B0385424	-	-	-
Q610	TA8211AH	B0376856	-	-	-
Q611	2SC2878-A(TE)	A6342206	-	-	-
Q612	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
	2SA564A-Q	-	NTE290A	ECG290A	SK3932
Q613	2SC2878-A(TE)	A6342206	-	-	-
# Q801	STR-Z2753	23905433	-	-	-
Q817	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1815Y	-	NTE85	ECG85	SK3124A
Q818	RN2201	A6012010	-	-	-
Q819	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1815-Y	-	NTE85	ECG85	SK3124A
Q840	L78MR05	23318299	-	-	-
Q843	RN1205	A6002050	-	-	-
Q862	TLP621(GRL)	A8643135	NTE3098	ECG3098	SK10178
# Q883	S1854FA-4	A6907777	-	-	-
Q901, 02, 03	2SC2482(C)	A6330059	NTE399	ECG399	SK9352
Q971	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
	2SA1015Y	-	NTE290A	ECG290A	SK9132
QA01	TMP87CM34BN-3298	23905569	-	-	-
QA02	24LC02BI/P	23904941	-	-	-
	ST24C02CB6	-	-	-	-
	XL24C02P	-	-	-	-
QB01	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
QB03	RN1205	A6002050	-	-	-
QB21, 30, 40	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q, TH	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QG01	UPC1851CU	23905591	-	-	-
QG05	2SC2655-Y(C)	A6333346	NTE293	ECG293	SK3849

For SAFETY use only equivalent replacement part.

PARTS LIST continued

CONTROLS & RESISTORS			
Item No.	Function/Rating	Mfr. Part No.	NTE Part No.
R228	30K 2% 1/8W	24384303	EW330
# R327	4.7 5% 1/4W Fusible	24545479	-
# R336	270 5% 2W	24383271	2W127
# R416	1500 5% 5W Wirewound	24019321	5W215
R442	1000 5% 1W Fusible	24532102	F1W210
# R448	.82 5% 1W	24338828	1WD82
# R475	100 5% 1/8W	24366101	EW110
# R478	13K 1% 1/4W	24327133	-
# R482	5600 1% 1/4W	24327562	-
R488, 89	18K 1% 1/4W	24327183	-
R808	7 Cold PTC	24000269	-
R810	1.1 5% 5W Wirewound	24510119	5W1D1
# R898	3.9M 10% 1/2W	24002000	HW539
# R920	5.1 5% 1W Fusible	24000880	F1W5D1
RG15	15K 1% 1/4W	24327153	-
RG45	4.7 5% 1/4W Fusible	24545479	-

For SAFETY use only equivalent replacement part.

CAPACITORS & ELECTROLYTICS		
Item No.	Rating	Mfr. Part No.
C209	2.2 μ F 20% 50V NP	24085944
# C440	.0082 3% 1.25kV	24082791
# C442	.43 5% 250V	24082697
C504	9pF \pm 0.25pF NPO	24353090
C801	.47 20% 125VAC	24082001
# C810	220 μ F 20% 200V	24086052
# C811	.0047 20% 250VAC	24092270
# C812, 15	.0022 20% 250VAC	24092583
	.0022 20% 400VAC	24094820
C865	.001 10% 2kV	24092345
C871	.001 10% 2kV	24092345
C893	270pF 10% 2kV	24092338
C894	270pF 10% 2kV	24092338
C902	.001 10% 2kV	24211102
CG13	3.3 μ F 20% 16V Tantalum	24704335
CG16	10 μ F 20% 16V Tantalum	24704106
# G813	.0047 20% 250VAC	24092270
	.0047 20% 400VAC	24094820
# G814	.0022 20% 250VAC	24094820
	.0022 20% 400VAC	24094820
# G816	.0022 20% 250VAC	24094820
	.0022 20% 400VAC	24094820

For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS		
Item No.	Function/Rating	Mfr. Part No.
G500	-	23238714
G861	Ferrite Bead	-
L101	-	23289220
L202	-	23289109
L204	-	23289100
L205	-	23289470
L301	Ferrite Bead	23103880
L400	-	23289100
# L441	Horizontal Linearity	23248168
# L462	Yoke Horiz 2.1mH Vert 18.9mH	23231119
L805	-	23248159
L806	-	23221747
L862	Ferrite Bead	23103880
L883, 84	Ferrite Bead	23103880
L885	-	23221722
L886, 88	Ferrite Bead	23103880
# L901	Degaussing	23200919
LA01	-	23289100
LB02	56 μ H	23289560
T401	Horizontal Drive	23224983
# T461	Horizontal Output	23236507
# T801	Line Filter	23211668
# T840	Power	23213513
# T862	Converter	23217370

For SAFETY use only equivalent replacement part.

(1) Focus and screen controls are part of T461.

MISCELLANEOUS			
Item No.	Description	Mfr. Part No.	Notes
# F470	Fuse	23144803	1Amp, 250V, Fast Acting
# F801	Fuse	23144888	5Amp, 125V, Slow Blow
# F860	Fuse	23144509	2.5Amp, 125V
F889	Fuse	23144776	1.6Amp, 125V
# H001 (1)	Module	23321226	Tuner IF, EL923L2
KB01	Receiver	23905177	Remote, PIC-TB16
# P801	Line Cord	23176006	AC, Polarized
PV03	Jack	23365833	Assembly
SA01	Switch	23145227	Channel Up
SA02	Switch	23145227	Channel Down
SA03	Switch	23145227	Volume Up
SA04	Switch	23145227	Volume Down
SA05	Switch	23145227	Video
SA06	Switch	23145227	Memory (Menu)
SA07	Switch	23145227	Power
SP1, 2	Speaker	23351065	2" X 3 1/2", 8 Ohms, 2W
# SR81 (3)	Relay	23146564	Power
# SR81 (2)	Relay	23146916	Power
# V901	CRT	23312676	A48KZL70X(LW)
# V901A	Socket	23902021	CRT
X401	Crystal	23153721	503kHz
X501	Crystal	23153961	3.58MHz
XA01	Crystal	23153325	8MHz
Fuse Holder		23165433	-
Magnet		23102399	Purity/Convergence
PC Board (2)		-	CRT, PB6290E2
PC Board (3)		-	CRT, PB6290F2
PC Board (2)		-	Main, PB6290E-1
PC Board (3)		-	Main, PB6290F-1
Transmitter (4)		23306182	Remote, CT-9865
Transmitter (3)		23306185	Remote, CT-9873
Transmitter (5)		23306172	Remote, CT-9855
Wedge		23848729	Yoke Positioning (3 Used)

For SAFETY use only equivalent replacement part.

(1) Contact TNI Electronics for replacement; order by part number on tuner.

(2) Used in models CF19G32 and CL20G30.

(3) Used in model CE19G10.

(4) Used in model CF19G32.

(5) Used in model CL20G30.

CABINET PARTS	
Item	Mfr. Part No.
Button Control	23444893
Button Power	23444892
Cabinet Front	23410916
Cabinet Rear	23426923